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IS 4447 (1994): Sodium Benzoate, Food Grade [FAD 8: Food Additives]

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सोडियम बेंजोइट, खाद्य ग्रेड — विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

SODIUM BENZOATE, FOOD GRADE — SPECIFICATION

(First Revision)

UDC 664.099.62 : 547.562

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1994

Price Group 3

Food Additives Sectional Committee, FAD 8

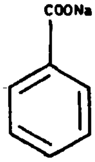
FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Food Additives Sectional Committee had been approved by the Food and Agriculture Division Council.

With the increased production of processed foods, manufacturers have started adding a large number of substances, generally in small quantities, to improve the appearance, flavour, texture or storage properties of the processed foods. As certain impurities in these substances have been found to be harmful, it is necessary to have a strict quality control of these food additives. A series of standards is, therefore, being prepared by this Bureau to cover purity and identification of these substances. It is hoped that these standards would help in checking purity which requires to be checked at the stage of manufacture, for it is extremely difficult (and in many cases impossible) to detect the impurity once these substances have been added to the processed foods. Besides, these standards are intended to guide the indigenous manufacturers in making their product conform to specification that are accepted by scientists, health authorities and international bodies.

Sodium benzoate widely used as a food preservative in the various food products is permitted under the *Prevention of Food Adulteration Rules*, 1955, as well as *Fruit Products Order*, 1955.

Chemical Names and Formula — The recognized chemical names are sodium benzoate; sodium salt of benzene carboxylic acid; and sodium salt of phenyl carboxylic acid. Empirical formula of sodium benzoate is $C_7H_5O_2Na$. Its molecular weight is 144.11. Structural formula of sodium benzoate is given below:



In this revision, solubility has been brought under description and as given in Note under **3.1**, it is intended only as information regarding approximate solubility and is not to be considered as a quality requirement.

Further, in this revision the test for polycyclic acid has been deleted as this was repetition of the melting range, and melting range has been covered under the table of requirements instead of under identification tests. The limit for lead has been substituted by heavy metals.

This standard was first published in 1967. It is being revised to align it with the following International as well as EEC Standards.

> FAO Food and Nutrition Paper No. 4 — Specifications for identity and purity of thickening agents, anticaking agents, antimicrobials, antioxidants and emulsifiers, published by the Joint FAO/WHO Expert committee on Food Additives, Rome 1978.
>
> Food Chemical Codex, 1981 Pub. National Academy of Sciences and National Research Council, Washington DC, USA.
>
> Council Directive 65/66/EEC of 26 January 1965 laying down specific criteria of purity for preservatives authorized for use in foodstuffs instead intended for human consumption.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding of numerical values *(revised)*'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SODIUM BENZOATE, FOOD GRADE — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard prescribes the requirements and the method of sampling and test for sodium benzoate for use as a food preservative.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
1070 : 1992	Reagent grade water (*third revision*)
1699 : 1994	Methods of sampling and test for food colours (*second revision*)
4448 : 1994	Benzoic acid, food grade (*first revision*)

3 REQUIREMENTS

3.1 Description

Sodium benzoate is a white, almost odourless, crystalline powder or flakes. It is freely soluble in water and sparingly soluble in 95 percent ethanol.

NOTE — The solubility is intended only as information regarding approximate solubility and is not to be considered as a quality requirement and is of minor significance as a means of identification or determination of purity and dependence must be placed on other specifications.

3.2 Identification Tests

3.2.1 *Reaction with Ferric Chloride*

When ferric chloride solution is added to a 10 percent solution of sodium benzoate in water , a buff coloured precipitate shall be formed.

3.2.2 *Test for Sodium*

3.2.2.1 *Reaction with uranyl zinc acetate*

The material shall give a yellow crystalline precipitate with uranyl zinc acetate when tested by the method prescribed in Annex A.

3.2.2.2 *Flame test*

The material shall give a distinct golden-yellow flame.

3.2.2.3 *Melting range of precipitate with hydrochloric acid*

The melting range of precipitate obtained with hydrochloric acid shall be between 121.5°C to 123.5°C as determined by the method described in Annex C.

3.3 The material shall also conform to the requirements given in Table 1.

Table 1 Requirements For Sodium Benzoate

Sl No.	Characteristic	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Purity, expressed as $C_7H_5O_2N$, percent by mass, *Min*	99.0	Annex B
ii)	Melting range of liberated benzoic acid	121.5°C- 123.5°C	Annex C
iii)	Moisture, percent by mass, *Max*	1.5	Annex D
iv)	Acidity or alkalinity	To conform to test	Annex E
v)	Readily carbonizable substances	To conform to test	Annex F
vi)	Readily oxidizable substances	To conform to test	Annex G
vii)	Chlorinated organic compounds	To conform to test	Annex H
viii)	Arsenic (as As), mg/kg, *Max*	3.0	15 of IS 1699 : 1994
ix)	Heavy metals (as Pb) mg/kg, *Max*	10	Annex J

4 PACKING AND MARKING

4.1 Packing

The material shall be filled in amber coloured glass containers, or any other well-closed containers, or suitable bag with inner lining of food grade material, with as little air space as possible. The containers shall be such as to preclude contamination of the contents with metals or other impurities.

4.2 Marking

4.2.1 Each container shall be legibly and indelibly marked with the following information:

a) Name of the material, including the words 'Food Grade';
b) Source of manufacture;
c) Date of manufacture;
d) Minimum net contents;
e) Batch or code number; and
f) Any other requirements as given under the Standards of *Weights and Measures (Packaged Commodities) Rules*, 1977/*Prevention of Food Adulteration Rules*, 1955.

4.2.2 *BIS Certification Marking*

The product may also be marked with the Standard Mark.

4.2.2.1 The use of the Standard Mark is governed by the Provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

5 SAMPLING

5.1 Representative samples of the material shall be drawn according to the method prescribed in 4 of IS 1699 : 1994.

6 TESTS

6.1 Tests shall be carried out by the methods as specified in 3.2 and col 4 of Table 1.

6.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070 : 1992) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the experimental results.

ANNEX A

(*Clause* 3.2.2.1)

REACTION WITH URANYL ZINC ACETATE

A-1 REAGENTS

A-1.1 Acetic Acid Dilute

Prepare a solution containing approximately 30 percent *m/v* of CH_3COOH in water.

A-1.2 Uranyl Zinc Acetate Solution

Dissolve 10 g of uranyl acetate by heating with 50 ml of water and 5 ml of acetic acid (30 percent solution). Dissolve 30 g of zinc acetate by heating with 30 ml of water and 3 ml of acetic acid. Mix the two solutions, allow to cool to room temperature, and remove by filteration any solid material which separates.

A-2 PROCEDURE

A-2.1 Acidify the solution of sodium benzoate with the acetic acid. Filter if necessary. Add to the solution the uranyl zinc acetate solution. A yellow crystalline precipitate shall form.

ANNEX B

[*Table* 1, *Item* (i)]

DETERMINATION OF PURITY

B-1 REAGENTS

B-1.1 Hydrochloric Acid — 0.1. N.

B-1.2 Standard Hydroxide Solution — 0.5 N.

B-1.3 Phenolphthalein Indicator

Dissolve 0.2 g of phenolphthalein ($C_{20}H_{14}O_4$) in 60 ml of 90 percent ethanol and add a sufficient quantity of water to produce 100 ml.

B-1.4 Ether

B-1.5 Bromophenol Blue

Warm 0.1 g of bromophenol blue with 3.2 ml of 0.05 N sodium hydroxide and 5 ml of 90 percent ethanol. After the solution is effected, add sufficient quantity of 20 percent ethanol to make 250 ml.

B-2 PROCEDURE

B-2.1 Weigh accurately 2.500 to 3.000 g of sodium benzoate, previously dried and dissolve in 50 ml of water. Neutralize the solution, if necessary, with 0.1 N hydrochloric acid, using phenolphthalein. Add 50 ml of ether and a few drops of bromophenol blue and titrate with 0.5 N standard hydrochloric acid, shaking constantly until the colour of the indicator begins to change. Separate the lower layer, wash the ethereal layer with 10 ml of water, and to the separated aqueous layer add the washings and an additional 20 ml of ether. Complete the titration with 0.5 N standard hydrochloric acid, shaking constantly. Note the volume of 0.5 N standard hydrochloric acid consumed.

B-3 CALCULATION

B-3.1 Calculate as follows the amount and percentage of $C_7H_5O_2Na$ present:
Each ml of 0.5 N hydrochloric acid, is equivalent to 0.072 05 g of $C_7H_5O_2Na$.

ANNEX C

[*Clause* 3.2.2.3 *and Table* 1, *Item* (ii)]

DETERMINATION OF MELTING RANGE

C-1 REAGENT

C-1.1 Hydrochloric Acid, Dilute

Mix 260 ml of hydrochloric acid (25 percent *m/v* solution in water) with sufficient water to produce 1 000 ml.

C-2 PROCEDURE

C-2.1 Prepare a 2 percent solution of sodium benzoate. Acidify it with the hydrochloric acid. White precipitate shall be formed. Wash the precipitate with distilled water till free from chloride. Dry the precipitate and determine its melting point by the method given in Annex B of IS 4448 : 1994.

ANNEX D

[*Table* 1, *Item* (iii)]

DETERMINATION OF MOISTURE

D-1 APPARATUS

D-1.1 Oven — maintained at 105 ± 1°C.

D-1.2 Weighing Bottle — glass-stoppered , shallow.

D-2 PROCEDURE

D-2.1 Weigh 2 g of the powdered sample to accuracy of 0.1 mg in a tared weighing bottle. Distribute the sample as evenly as practicable to a depth of about 5 mm. Place the bottle containing the sample (uncovered) in the oven maintained at 105±1°C. Remove the bottle from the oven after two hours, close the bottle promptly, allow it to come to room temperature in a desiccator and weigh it. Keep the bottle again in the oven for one hour, cool and weigh. Repeat the process till constant mass is reached.

D-2.2 Calculate the loss on drying percent by mass, and express as moisture.

ANNEX E

[*Table* 1, *Item* (iv)]

TEST FOR ACIDITY OR ALKALINITY

E-1 REAGENTS

E-1.1 Standard Sodium Hydroxide for Hydrochloric Acid — 0.1.N.

E-1.2 Phenolphthalein Indicator — Same as **B-1.3**.

E-2 PROCEDURE

E-2.1 2.0 g of sodium benzoate dissolved in 20 ml of freshly boiled water, shall require for neutralization not more than 0.5 ml of either standard sodium hydroxide or standard hydrochloric acid, using phenolphthalein as indicator.

ANNEX F

[*Table* 1, *Item* (v)]

TEST FOR READILY CARBONIZABLE SUBSTANCES

F-1 REAGENTS

F-1.1 Sulphuric Acid — 94.5 to 95.5 percent.

F-1.2 Matching Fluid

Composed of 0.2 ml of cobalt chloride solution (*see* **F-1.2.1**), 0.3 ml of ferric chloride solution (*see* **F-1.2.2**), 0.1 ml of cupric sulphate (*see* **F-1.2.3**) and 4.4 ml of water.

F-1.2.1 *Cobalt Chloride Solution*

Dissolve about 65 g of cobalt chloride ($CoCl_2 . 6H_2O$) in enough of a mixture of 25 ml of hydrochloric acid and 975 ml of water to make 1 000 ml. Place exactly 5 ml of this solution in a 250-ml iodine flask, add 5 ml of 3 percent hydrogen peroxide and 15 ml of 20 percent sodium hydroxide solution. Boil for 10 minutes, cool, and add 2 g of potassium iodide and 20 ml of 25 percent sulphuric acid. When the precipitate has dissolved, titrate the liberated iodine with 0.1 N sodium thiosulphate solution, adding starch. Each millilitre of 0.1 N sodium thiosulphate is equivalent to 23.8 mg of $CoCl_2 . 6H_2O$. Adjust the final volume of the solution by adding enough of the mixture of hydrochloric acid and water to make each millilitre contain 59.5 mg of $CoCl_2 . 6H_2O$.

F-1.2.2 *Ferric Chloride Solution*

Dissolve about 55 g of ferric chloride in enough of a mixture of 25 ml of hydrochloric acid and 975 ml of water to make 1 000 ml. Place 10 ml of this solution in a 250-ml iodine flask, add 15 ml of water and 3 g of potassium iodide and allow the mixture to stand for 15 minutes. Dilute with 100 ml of water, and titrate the liberated iodine with 0.1 N sodium thiosulphate solution adding starch. Each millilitre of 0.1 N sodium thiosulphate is equivalent to 27.03 mg of $FeCl_3 . 6H_2O$. Adjust the final volume of the solution by addition of enough of the mixture of hydrochloric acid and water to make each millilitre contain 45.0 mg of $FeCl_3 . 6H_2O$.

F-1.2.3 *Cupric Sulphate Solution*

Dissolve about 65 g of cupric sulphate ($CuSO_4 . 5H_2O$) in enough of a mixture of 25 ml of hydrochloric acid and 975 ml of water to make 1 000 ml. Place 10.0 ml of this solution in a 250-ml iodine flask and add 40 ml of water, 4 ml of acetic acid and 3 g of potassium iodide. Titrate the liberated iodine with 0.1 N sodium thiosulphate adding starch. Each millilitre of 0.1 N sodium thiosulphate is equivalent to 24.97 mg of $CuSO_4 . 5H_2O$. Adjust the final volume of the solution by addition of enough of the mixture of hydrochloric acid and water to make each millilitre contain 62.4 mg of $CuSO_4 . 5H_2O$.

F-2 PROCEDURE

F-2.1 Dissolve 0.500 g of sodium benzoate in 5 ml of sulphuric acid; the solution shall not have deeper colour than the matching fluid (**F-1.2**).

ANNEX G

[*Table* 1, *Item* (vi)]

TEST FOR READILY OXIDIZABLE SUBSTANCES

G-1 REAGENTS

G-1.1 Sulphuric Acid — 94.5 to 95.5 percent.

G-1.2 Standard Potassium Permanganate Solution — 0.1 N.

G-2 PROCEDURE

G-2.1 Add 1.5 ml of sulphuric acid to 100 ml of water, heat to boiling and add standard potassium permanganate solution in drops, until the pink colour persists for 30 seconds. Dissolve 1.000 g of sodium benzoate in the heated solution, and titrate with standard potassium permanganate solution to a pink colour that persists for 15 seconds. Not more than 0.5 ml of 0.1 N standard potassium permanganate shall be required.

ANNEX H

[*Table* 1, *Item* (vii)]

TEST FOR CHLORINATED ORGANIC COMPOUNDS

H-1 REAGENTS

H-1.1 Concentrated Nitric Acid — 69.0 to 71.0 percent.

H-1.2 Calcium Carbonate

H-1.3 Dilute Nitric Acid

Mix 190 ml of 50 percent nitric acid with sufficient water to make up 1 000 ml.

H-1.4 Silver Nitrate Solution — 0.1 N.

H-1.5 Standard Hydrochloric Acid — 0. 1 N.

H-2 PROCEDURE

H-2.1 Dissolve 0.25 g of sodium benzoate in 10 ml water. Acidify with concentrated nitric acid and filter off the precipitate. Mix the precipitate with 0.5 g of calcium carbonate, dry the mixture and then ignite. Take up the ignited residue in 20 ml of dilute nitric acid and filter. Mix the solution with 0.5 ml of silver nitrate solution. The turbidity shall be not more than that obtained in a similar volume by addition of 0.5 ml of silver nitrate solution and 0.05 ml of standard hydrochloric acid.

ANNEX J

[*Table* 1, *Item* (ix)]

TEST FOR HEAVY METALS

J-1 REAGENTS

J-1.1 Ammonia Solution

Dilute 400 ml of 28 percent ammonium hydroxide to 1 000 ml with water.

J-1.2 Acetic Acid Solution — 6 percent (*m*/*v*).

J-1.3 Hydrochloric Acid — 10 percent.

J-1.4 Lead Nitrate Stock Solution

Dissolve 159.8 mg of lead nitrate Pb $(NO_3)_2$ in 100 ml of water containing 1 ml of nitric acid, then dilutes with water to 1 000 ml and mix. This solution should be prepared and stored in glass containers which are free from lead salts.

J-1.5 Standard Lead Solution

On the day of use, dilute 10 ml of lead nitrate stock solution, accurately measured, with water to 100 ml. Each ml of the solution so prepared contains the equivalent of 10 microgram of lead ion (Pb).

J-1.6 Hydrogen Sulphide

A saturated solution of hydrogen sulphide made by passing H_2S in cold water.

J-2 PROCEDURE

J-2.1 Solution A

Take 2 ml of the standard lead solution in a 50-ml Nessler tube and add water to make 25 ml. Adjust the *p*H to between 3.0 and 4.0 (*p*H indicator paper) by the addition of diluted acetic acid or ammonia solution. Dilute with water to 40 ml and mix.

J-2.2 Solution B

Dissolve 4 gram of Sodium benzoate in 40 ml of water, add dropwise with vigorous stirring, 10 ml of diluted hydrochloric acid and filter. Take 25 ml of the above solution in a 50-ml colour comparison tube that matches the one used for solution A and adjust the *p*H to between 3.0 and 4.0 (*p*H indicator paper) by the addition of dilute acetic acid solution or ammonia solution. Dilute to 40 ml with water and mix.

J-2.3 To each tube add 10 ml of freshly prepared hydrogen sulphide solution. Mix, allow to stand for 5 minutes and view down over a white surface. The colour of solution B shall not be darker than that of solution A.

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This Indian Standard has been developed from Doc : No. FAD 8 (313). ✓

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 OCTOBER 1995
To
IS 4447 : 1994 SODIUM BENZOATE, FOOD GRADE — SPECIFICATION

(First Revision)

(*Foreword, para* 5, *line* 2) — Delete the words 'under the table of requirements instead of'.

(*Page* 1, *Table* 1) — Delete Sl No. (ii) and renumber the subsequent serial numbuers.

(FAD 8)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 2 MARCH 2005
TO
IS 4447 : 1994 SODIUM BENZOATE, FOOD GRADE — SPECIFICATION

(First Revision)

(*Second cover page, Foreword*) — Insert the following before the last para:

'A scheme for labelling environment friendly products known as ECO-Mark has been introduced at the instance of the Ministry of Environment and Forests (MEF), Government of India. The ECO-Mark shall be administered by the Bureau of Indian Standards (BIS) under the *BIS Act*, 1986 as per the Resolution No. 71 dated 20 February 1991 as published in the Gazette of the Government of India vide GSR No. 85 (E) dated 21 February 1991. For a product to be eligible for marking with the ECO-Mark it shall also carry the Standard Mark of BIS for quality besides meeting additional environmental friendly (EF) requirements. The EF requirements for sodium benzoate are, therefore, being included through Amendment No. 2 to this standard.

This Amendment is based on Gazette Notification No. 215(E) dated 17 May 1996 for labelling Food Additives as environment friendly products, published by the Ministry of Environment and Forests.'

(*Page* 1, *clause* **3.3**) — Insert the following new clause after **3.3**:

3.4 Additional Requirements for ECO-Mark

3.4.1 *General Requirements*

3.4.1.1 The product shall conform to the requirements prescribed under **3.1** to **3.3**.

3.4.1.2 The product manufacturer shall produce the consent clearance as per the provisions of *Water (Prevention & Control of Pollution) Act*, 1974, *Water (Prevention & Control of Pollution) Cess Act*, 1977 and *Air (Prevention & Control of Pollution) Act*, 1981 along with the authorization, if required, under *Environment (Protection) Act*, 1986 and the Rules made thereunder to Bureau of Indian Standards while applying for the ECO-Mark; and the product shall also be in accordance with the *Prevention of Food Adulteration Act*, 1954 and the Rules made thereunder.

3.4.1.3 The product/packing shall display in brief the criteria based on which the product has been labelled environment friendly.

3.4.1.4 The material used for product packaging shall be recyclable or biodegradable.

3.4.1.5 The date of manufacture and best before date shall be declared on the product package by the manufacturer.

3.4.1.6 The product package or leaflet accompanying it may display instructions of proper use and storage so as to maximize the product performance, safety and minimize wastage.

3.4.2 *Specific Requirements*

3.4.2.1 In Table 1, the requirement for purity specified under Sl No. (i) shall be not less than 99.5 percent of $C_7H_5O_2N$ calculated on dry basis and requirement for arsenic specified under Sl No. (viii) shall be not more than 1.5 mg/kg in place of existing for the product to be eligible for the ECO-Mark.

[*Page* 1, *Table* 1, *Sl No.* (i), *col* 2] — Substitute 'Purity, expressed as $C_7H_5O_2N$, percent by mass, on dry basis, *Min*' *for* 'Purity, expressed as $C_7H_5O_2N$, percent by mass, *Min*'.

(*Page* 2, *clause* **4.2.2.1**) — Insert the following new clause after **4.2.2.1**:

'**4.2.3** *ECO-Mark*

The product may also be marked with the ECO-Mark, the details of which may be obtained from Bureau of Indian Standards.'

(FAD 8)

Reprography Unit, BIS, New Delhi, India